

# Appendices

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# Appendix 1 Bicycle and Bikeway Act of 1974

## **G.S. 136-71.6. How Article cited.**

This Article may be cited as the North Carolina Bicycle and Bikeway Act of 1974. (1973, c. 1447, s.1)

## **G.S. 136-71.7. Definitions.**

As used in this Article, except where the context clearly requires otherwise, the words and expressions defined in this section shall be held to have the meanings here given to them:

(1) bicycle: a nonmotorized vehicle with two or three wheels tandem, a steering handle, one or two saddle seats and pedals by which the vehicle is propelled.

(2) bikeway: A thoroughfare suitable for bicycle, and which may either exist within the right-of-way of other modes of transportation, such as highways, or along a separate and independent corridor.

(3) Department: North Carolina Department of Transportation.

(4) Program: North Carolina Bicycle and Bikeway Program.

(5) Secretary: The Secretary of the North Carolina Department of Transportation. (1973, c.1447, s. 2; 1975, c. 716, 2.7; 1977, c. 1021, s.1.)

## **G.S. 136-71-8. Findings.**

The General Assembly hereby finds that it is in the public interest, health, safety, and welfare for the State to encourage and provide for the efficient and safe use of the bicycle; and that to coordinate plans for bikeways most effectively with those of the State and local governments as they affect roads, streets, schools, parks and other publicly owned lands, abandoned roadbeds and conservation areas, while maximizing the benefits from the use of tax dollars, a single State agency, eligible to receive federal matching funds, should be designated to establish and maintain a statewide bikeways program. The General Assembly also finds that bikeways are a bona fide highway purpose, subject to the same rights and responsibilities, and eligible for the same considerations as other highway purposes and functions. (1973, c. 1447, s. 3; 1977, c 1021, 2.1.)

## **G.S. 136-71.9. Program development.**

The Department is designated as such State agency, responsible for developing and coordinating the program (1973, c. 1447, s.4.)

## **G.S. 136-71.10 Duties.**

The Department will:

(1) Assist and cooperate with local governments and other agencies in the development and construction of local and regional bikeway projects;

(2) Develop and publish policies, procedures, and standards for planning, designing, constructing, maintaining, marking, and operating bikeways in the State; for the registration and security of bicycles; and for the safety of bicyclists, motorists, and the public.

(3) Develop bikeway demonstration projects and safety training programs;

(4) Develop and construct a State bikeway system. (1973, c. 1447, s.5.)

## **G.S. 136-71-11. Designation of bikeways.**

bikeways may be designated along and upon the public roads. (1973, c. 1447, s.5.)

## **G.S. 136-71.12. Funds.**

The General Assembly hereby authorizes the Department to include needed funds for the program in its annual budgets for fiscal years after June 30, 1975, subject to the approval of the General Assembly.

The Department is authorized to spend any federal, State, local or private funds available to the Department and designated for the accomplishments of this Article. Cities and towns may use any funds available. (1973, c. 1447, s.6.)

## **G.S. 136-71.13. North Carolina Bicycle Committee; composition, meetings, and duties.**

(a) There is hereby created a North Carolina Bicycle Committee within the Department of Transportation. The bicycle Committee shall consist of seven members appointed by the Secretary. Members of the Committee shall receive per diem and necessary travel and subsistence expense in accordance with the provisions of G.S. 138-5. Initially, three members shall be appointed for two years, and four members for four years; thereafter each appointment shall be for four years. Upon the resignation of a member in midterm, the replacement shall be appointed for the remainder of the unexpired term. The Secretary shall make appointments to the Committee with a view to providing representation to each of the State's geographical regions and to the various types of bicycle users and interest.

(b) The Bicycle Committee shall meet in various sections of the State, not less than once in any three months, and at such other times as may be necessary to fulfill its duties. A majority of the members of the Committee shall constitute a quorum for the transaction of business. The staff of the bicycle and bikeway program shall serve the Committee, maintain the minutes of Committee meetings, research questions of bicycle transportation importance, and undertake such other activities for the Committee as may be consistent with the program's role within the Department.

(c) The Bicycle Committee shall have the following duties:

(1) To represent the interests of bicyclists in advising the Secretary on all matters directly or indirectly pertaining to bicycles and bikeways, their use, extent, location, and other objectives and purposes of this Article;

(2) To adopt bylaws for guiding its operation, as well as an outline for pursuing a safer environment for bicycling in North Carolina;

(3) To assist the bicycle and bikeway program in the exercise of its duties within the Department; and

(4) To promote the best interest of the bicycling public, within the context of the total transportation system, to governing officials and the citizenry at large.

(d) The Secretary, with the advice of the bicycle Committee, shall coordinate bicycle activities among the divisions of the Department, as well as between the Department of Transportation and the other departments. Further, he shall study bicycle and bikeway needs and potentials and report the findings of said studies, with the Committee's recommendations, to the appropriate policy or legislative bodies. The Secretary shall transmit an annual report to the Governor and General Assembly on bicycle and bikeway activities within the Department, including a progress report on the implementation of the Article. (1977, c. 1021, 2.1.)



# Appendix 2 NCDOT Bicycle Policy

## North Carolina Department of Transportation

*This bicycle policy revokes and replaces the former bicycle policy adopted by the Board of Transportation in November 1978. The revised bicycle policy was adopted on April 4, 1991.*

### General

Pursuant to the Bicycle and Bikeways act of 1974, the Board of Transportation finds that bicycling is a bonafide highway purpose subject to the same rights and responsibilities and eligible for the same considerations as other highway purposes, as elaborated below.

1. The Board of Transportation endorses the concept that bicycle transportation is an integral part of the comprehensive transportation system in North Carolina.

2. The Board of Transportation endorses the concept of providing bicycle transportation facilities within the rights-of-way of highways deemed appropriate by the Board.

3. The Board of Transportation will adopt "Design Guidelines for Bicycle Facilities." These guidelines will include criteria for selecting cost-effective and safety-effective bicycle facility types and a procedure for prioritizing bicycle facility improvements.

4. Bicycle compatibility shall be a goal for state highways, except on fully controlled access highways where bicycles are prohibited, in order to provide reasonably safe bicycle use.

5. All bicycle transportation facilities approved by the Board of Transportation shall conform with the adopted "Design Guidelines for Bicycle Facilities" on state-funded projects, and also with guidelines published by the American Association of State Highway and Transportation Officials (AASHTO) on federal aid projects.

### Planning and Design

It is the policy of the Board of Transportation that bicycle facility planning be included in the state thoroughfare and project planning process.

1. The intent to include planning for bicycle facilities within new highway construction and improvement projects is to be noted in the Transportation Improvement Program.

2. During the thoroughfare planning process, bicycle usage shall be presumed to exist along certain corridors (e.g., between residential developments, schools, businesses and recreational areas). Within the project planning process, each project shall have a documented finding with regard to existing or future bicycling needs. In order to use available funds efficiently, each finding shall include measures of cost-effectiveness and safety-effectiveness of any proposed bicycle facility.

3. If bicycle usage is shown likely to be significant, and it is not prohibited, and there are positive cost-effective and safety-effective findings; then, plans for and designs of highway construction projects along new corridors, and for improvement projects along existing highways, shall include provisions for bicycle facilities (e.g., bike routes, bike lanes, bike paths, paved shoulder, wide

outside lanes, bike trails) and secondary bicycle facilities (traffic control, parking, information devices, etc.).

4. Federally funded new bridges, grade separated interchanges, tunnels, viaducts and their improvements, shall be designed to provide safe access to bicycles, pursuant to the policies of the Federal Highway Administration.

5. Barriers to existing bicycling shall be avoided in the planning and design of highway projects.

6. Although separate bicycle facilities (e.g., bike paths, bike trails) are useful under some conditions and can have great value for exclusively recreational purposes, incorporation of on-road bicycle facilities (e.g., bicycle lanes, paved shoulders) in highway projects are preferred for safety reasons over separate bicycle facilities parallel to major roadways. Secondary complementary bicycle facilities (e.g., traffic control, parking, information devices, etc.) should be designed to be within highway rights-of-way.

7. Technical assistance shall be provided in the planning and design of alternative transportation uses, including bicycling, for abandoned railroad rights-of-way. This assistance would be pursuant to the National Trails Act Amendment of 1983, and the resultant national Rails to Trails program, as will the Railway Revitalization Act of 1975.

8. Wherever appropriate, bicycle facilities shall be integrated into the study, planning, design and implementation of state funded transportation projects involving air, rail and marine transportation, and public parking facilities.

9. The development of new and improved bicycle control and information signs is encouraged for the increased safety of all highway users.

10. The development of bicycle demonstration projects which foster innovations in planning, design, construction and maintenance is encouraged.

11. Paved shoulders shall be encouraged as appropriate along highways for the safety of all highway users, and should be designed to accommodate bicycle traffic.

12. Environmental documents/planning studies for transportation projects shall evaluate the potential use of the facility by bicyclists and determine whether special bicycle facility design is appropriate.

13. Local input and advice shall be sought, to the degree practicable, during the planning stage and in advance of the final design of roadway improvements to ensure appropriate consideration bicycling needs, if significant.

14. On highways where bicycle facilities exist, (bike paths, bike lanes, bike routes, paved shoulders, wide curb lanes, etc.), new highway improvements shall be planned and implemented to maintain the level of existing safety for bicyclists.

15. Any new or improved highway project designed and constructed within a public-use transportation corridor with private funding shall include the same bicycle facility consideration as if the project had been funded with public funds. In private transportation projects (including parking facilities), where state funding or department approval is not involved, the same guidelines

and standards for providing bicycle facilities should be encouraged.

## Construction

It is the policy of the Board of Transportation that all state and federally funded highway projects incorporating bicycle facility improvements shall be constructed in accordance with approved state and federal guidelines and standards.

1. Bicycle facilities shall be constructed and bicycle compatibility shall be provided for, in accordance with adopted Design Guidelines for Bicycle Facilities and with guidelines of the American Association of State Highway and Transportation Officials.

2. Rumble strips (raised traffic bars), asphalt concrete dikes, reflectors and other such surface alterations, where installed, shall be placed in a manner as not to present hazards to bicyclists where bicycle use exists or is likely to exist. Rumble strips shall not be extended across shoulder or other areas intended for bicycle travel.

3. During restriping operations, motor vehicle traffic lanes may be narrowed to allow for wider curb lanes.

## Maintenance

It is the policy of the Board of Transportation that the state highway system, including state-funded bicycle facilities, shall be maintained in a manner conducive to bicycle safety.

1. State and federally funded and built bicycle facilities within the state right-of-way are to be maintained to the same degree as the state highway system.

2. In the maintenance, repair and resurfacing of highways, bridges and other transportation facilities, and in the installation of utilities or other structures, nothing shall be done to diminish existing bicycle compatibility.

3. Rough road surfaces which are acceptable to motor vehicle traffic may be unsuitable for bicycle traffic. Special consideration may be given for highways with significant bicycle usage.

4. For any state-funded bicycle project not constructed on state right-of-way, a maintenance agreement stating that maintenance shall be the total responsibility of the local government sponsor shall be negotiated between the department and the local government sponsor.

5. Pot-holes, edge erosion, debris, etc., are special problems for bicyclists and their elimination should be a part of each division's maintenance program. On identified bicycle facilities, the bike lanes and paths should be routinely swept and cleared of grass intrusion, undertaken within the discretion and capabilities of Division forces.

## Operations

It is the policy of the Board of Transportation that operations and activities on the state highway system and bicycle facilities shall be conducted in a manner conducive to bicycle safety.

1. A bicyclist has the right to travel at a speed less than that of the normal motor vehicle traffic. In exercising this right, the bicyclists also shall be responsible to drive his/her vehicle safely, with due consideration to the rights of other motor vehicle operators and bicyclists and in compliance with the motor vehicle laws of North Carolina.

2. On a case-by-case basis, the paved shoulders of those portions of the state's fully controlled access high-

ways may be studied and considered as an exception for usage by bicycles where adjacent highways do not exist or are more dangerous for bicycling. Pursuant to federal highway policy, usage by bicyclists must receive prior approval by the Board of Transportation for each specific segment for which such usage is deemed appropriate, and those segments shall be appropriately signed for that usage.

3. State, county and local law enforcement agencies are encouraged to provide specific training for law enforcement personnel with regard to bicycling.

4. The use of approved safety helmets by all bicyclists is encouraged.

## Education

It is the policy of the Board of Transportation that education of both motorists and bicyclists, regarding the rights and responsibilities of bicycle riders, shall be an integral part of the department's Bicycle Program.

School systems are encouraged to conduct bicycle safety education programs as a part of and in addition to driver's education program, to the maximum extent practicable, and in conjunction with safety efforts through the Governor's Highway Safety Program. The Division of Motor Vehicles is also urged to include bicycle safety and user information in its motor vehicle safety publications.

## Parking

It is the policy of the Board of Transportation that secure and adequate bicycle parking facilities shall be provided wherever practicable and warranted in the design and construction of all state-funded buildings, parks and recreational facilities.

# Appendix 3 THE Bicycle TIP Process

The Transportation Improvement Program (TIP) is the process through which local areas and citizens are asked to present their highway and transportation needs to state government. Bicycle safety needs are an important part of this process. Each year, a series of TIP meetings is scheduled around the state. Following the conclusion of the TIP meetings, all requests are evaluated. Bicycle improvement requests which meet project selection criteria are then scheduled into a four-year program as part of the state's long-term transportation program.

In fiscal year 1992, the North Carolina Board of Transportation allocated two million dollars annually for the provision of independent bicycle projects (i.e.,

those projects which are separate from any other scheduled highway improvements). Incidental projects, or those where the bicycle request is an incidental feature of a planned highway improvement, are built with a mixture of state and federal funds as part of overall highway improvement. Examples of bicycle projects already underway include signed bicycle routes, a greenway bicycle path, roadways with widened lanes, widened paved shoulders, bicycle parking, replacement of hazardous drainage grates and bicycle maps.

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## The Transportation Improvement Program Process: From Need to Bicycle or Pedestrian Improvement

- I. *Recognizing a need for a bicycle improvement project.* Somewhere in a local area there may be unsafe or difficult riding conditions for bicyclists which highlight a need for bicycle transportation improvements – be it an on-road improvement project such as wide paved shoulders, bicycle parking, an off-road bike path, or printed materials such as maps and safety brochures. Pedestrian needs also may be recognized.
- II. *The need is presented to the North Carolina Department of Transportation.* If it is a citizen or a private group, such as a local bicycle club, which has recognized a need for a bicycle improvement, there are several ways to present the need to transportation officials. First, a citizen or local club may write a letter presenting the need to the town or county manager's office. A follow-up telephone call should be made in order to learn the official's view of the proposed project. Town or county officials may, or may not, choose to include the improvement in their transportation improvement plan to be presented to the state at the yearly Transportation Improvement Program meeting.

If an official of an agency desires to make a bicycle request at a division TIP meeting but is not able to attend on the date of that meeting, there is a 30 day period following the meeting during which the request may be submitted in a letter addressed to the Secretary of the North Carolina Department of Transportation. All requests will receive the same degree of consideration.
- III. *All bicycle project requests are documented.* Following the public TIP meetings, requests for bicycle transportation improvement projects will be organized and documented by the NCDOT Office of Bicycle and Pedestrian Transportation. A survey will be sent to each individual or agency which has made a request. Information obtained from this survey will be used to determine the feasibility of the requested project as well as to assign a level of priority to it.
- IV. *Some bicycle and pedestrian improvement projects are selected for construction.* The Office of Bicycle and Pedestrian Transportation first evaluates and prioritizes all the requests; then a summary of the project requests is presented to the NCDOT Bicycle Committee for its review. Following their review, the committee forwards recommendations on the scheduling of some of the requested projects to the North Carolina Board of Transportation which makes the final decision on inclusion of the recommendations in the TIP. To be included in the TIP plan *does not guarantee that a requested project will be implemented. Rather, it means that the project will receive further study and will be implemented if feasible.*
- V. *Projects which are included in the TIP fall into two categories.* Bicycle and pedestrian projects which can be incorporated into a planned and scheduled highway improvement are categorized as *incidental projects*. The bicycle or pedestrian element will be considered during the planning and design phases of the total project. Incidental projects are built with a

combination of state and federal funds in the same manner as the larger highway project is constructed.

Bicycle projects which are not incorporated into a planned and scheduled highway improvement, but are planned, funded and built separately, are categorized as *independent projects*. These projects are constructed using 80% federal/20% state funding.

VI. *Finally, some TIP projects are implemented.* In the case of a scheduled incidental bicycle or pedestrian improvement, inclusion in the TIP means that the bicycle facility will be considered in conjunction with the planning and environmental studies for the given highway project. If the bicycle or pedestrian component of the project is deemed feasible, it will be scheduled for construction.

Following inclusion in the Bicycle TIP, each independent project will receive further study. This detailed planning study will include an evaluation of the feasibility of the proposed improvement as well as an actual project cost. Upon completion and acceptance by the NCDOT, the planning study will then be submitted to the North Carolina Board of Transportation for final approval and funding. A project must successfully pass through each of these levels in order to be implemented. During any of the above phases of project development, it may be necessary to alter, or, in some cases, eliminate a proposed improvement due to regulatory and design constraints or because of unanticipated costs.

VII. *TIP bicycle projects may take many forms.* There are a number of bicycle improvement projects which involve construction of on-road and off-road facilities. Some of these projects include: wide paved shoulders (4 ft minimum width), specially striped lanes for bicycles, wide outside lanes (13-14 ft minimum width) which permit a safer bicycle/automobile mix, greenway-type bicycle paths, railroad crossing improvements for bicycle safety, and the addition of bicycle-safe bridge railings.

However, there are eligible bicycle improvements that do not require a construction project. Examples of these include: signing bicycle routes; producing maps and safety brochures for cyclists in local areas; replacing dangerous drainage grates with bicycle-safe drainage grates; making spot improvements such as paving potholes or hazard marking of dangerous roadway features; and providing bicycle safety education materials to local areas.

In many cases it may be difficult to determine which kind of facility improvements is most

needed. Therefore, it is entirely appropriate to request that bicycle improvements be made along a particular corridor without specifying a particular type of treatment.

## **TIP Bicycle project selection criteria**

The following factors which affect bicycle project selection for the TIP is intended to provide guidance to local area requestors. It is important to note that:

- A. Many worthwhile projects will fulfill only a few of the following conditions. Nevertheless, we encourage submission of all needed projects, since cost constraints and regulations may change over the next few years, allowing us to schedule previously infeasible projects.
- B. Detailed project justification based on the factors listed below is not required at the time of project submission. We will contact you during a follow-up period to obtain any additional needed information.

## **The criteria are as follows:**

1. *Cost limitations:* Given current budget constraints, it is unlikely that any projects with a cost in excess of \$300,000 will be scheduled.
2. *Right-of-way:* Complete information regarding the right-of-way situation should be provided. Due to the limited size of our annual budget, projects requiring that NCDOT acquire right-of-way are unlikely to be scheduled.
3. *Design standards:* Projects must be in conformance with federally adopted bicycle design guidelines, as described in the AASHTO Guide for the Development of Bicycle Facilities (1991) and the NCDOT Bike Guidelines (1994). The "sidewalk bikepath," which is constructed adjacent to the roadway for two-way bicycle traffic, runs counter to the AASHTO guidelines and is discouraged within our program.
4. *Project purpose:* Each project must serve a primary bicycle transportation purpose, as opposed to a recreation or pedestrian purpose.
5. *Preliminary project approval:* All necessary permits and approval must be obtained for any project involving a public jurisdiction (including approval of Metropolitan Planning Organizations and inclusion in the local TIP, lease agreements, construction and encroaching permits, etc.).
6. *Local area involvement:* Project requests are viewed within the overall picture of bicycling in an area. Evidence of local concern and involvement via other bicycle projects or activities lends support to each specific bicycle request. Local participation (via a direct dollar share or design

services) is viewed as one measure of a local area's commitment to an improved bicycle environment.

7. *Inclusion in transportation or bicycle planning process.* Evidence that your specific bicycle request is an element of a comprehensive transportation or bicycle planning process provides critical support for your project.
8. *Project need:* Priority will be given to those projects where the greatest need can be demonstrated. Accident statistics, potential safety problems, and information regarding current or potential users of the facility can all provide project justification.
9. *Boardwalks:* Multi-use pathways that are intended to accommodate bicycles should not be designed with significant sections of boardwalk, or other such surfaces, which may be unsuitable for bicycle transportation purposes.



# Appendix 4 MUTCD Part IX

## A. GENERAL

### 9A-1 Requirements for Bicyclist Traffic Control Devices

Traffic control devices, whether they are intended for motorists or bicyclists, must adhere to five basic requirements to be able to perform their intended function. They must:

1. Fulfill a need.
2. Command attention.
3. Convey a clear simple meaning.
4. Command respect of road users.
5. Give adequate time for proper response.

The design, placement, operation, maintenance and uniformity of traffic control devices must be considered to meet the above requirements. Design is a critical feature to permit the device to fulfill a need and to command respect of road users. The placement – lateral, vertical and longitudinal – plays an important part in making the device effective and in giving adequate time for proper response. The operation of traffic in response to the device is, of course, the critical test of the device's effectiveness and a check on all five of the basic requirements.

Uniformity, achieved by following the recommendations and standards of this manual, greatly enhances the ability of a device to convey a clear, simple meaning to the user.

Whenever devices are installed, they should be warranted and based on a prior engineering study. Where the guidance provided by this part of the manual does not fully define where particular devices should be used, qualified traffic engineers should determine the application of devices on any bicycle facility before installation is made. It is intended that this manual define the standards for traffic control devices, but shall not be a legal requirement for their installation.

### 9A-2 Scope

This part covers bicycle-use related signs, pavement markings, and signals which may be used on highways or bikeways.

The following terms are used throughout Part IX:

**1. Bikeway:** Any road, street, path or way which in some manner is specifically designated as

being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

**2. Bicycle Trail:** A separate trail or path from which motor vehicles are prohibited and which is for the exclusive use of bicycles or the shared use of bicycles and pedestrians. Where such trail or path forms a part of a highway, it is separated from the roadways for motor vehicle traffic by an open space or barrier.

**3. Designated Bicycle Lane:** A portion of a roadway or shoulder which has been designated for use by bicyclists. It is distinguished from the portion of the roadway for motor vehicle traffic by a paint stripe, curb, or other similar device.

**4. Shared Roadway:** A roadway which is officially designated and marked as a bicycle route, but which is open to motor vehicle travel and upon which no bicycle lane is designated.

**5. Bicycle Route:** A system of bikeways designated by appropriate route markers, and by the jurisdiction having authority.

### 9A-4 Standardization of Devices

Standards for basic design elements and devices using these standards are given in this Manual. These standard devices generally will serve most applications. Where particular conditions require the use of a device that is not included in this Manual, the general principles in this Manual as to color, size, and shape should be followed wherever practical. Such devices should also follow the design, installation and application concepts contained in the Manual.

### 9A-5 Maintenance

Bicycle signs and markings should be properly maintained to command respect from both the motorist and the bicyclist. When installing signs and marking on bicycle facilities, care should be taken to have an agency designated to maintain these devices.

## 9A-6 Legal Authority

Traffic control devices shall be placed only by authority of a public body or official having jurisdiction, for the purpose of regulating, warning or guiding traffic. No traffic control device or its support shall bear any advertising or commercial message, or any other message that is not essential to traffic control.

All regulatory devices, if they are to be enforced, need to be backed by applicable laws, ordinances, or regulations.

In this part as in other parts of the Manual, the words “shall,” “should,” and “may” are used to describe specific conditions concerning traffic control devices. To clarify the meanings intended by the use of these words, the following definitions are provided:

**1. SHALL:** A “mandatory” condition. Where certain requirements in the design or application of the device are described with the “shall” stipulation, it is mandatory that these requirements be met.

**2. SHOULD:** An “advisory” condition. Where the word “should” is used, it is considered to be advisable usage, recommended but not mandatory.

**3. MAY:** A “permissive” condition. No requirement for application is intended. If a particular device is used under a “may” condition, however, its design shall follow the prescribed format.

## 9A-8 Relation to Other Documents

The Uniform Vehicle Code and Model Traffic Ordinance published by the National Committee on Uniform Traffic Laws and Ordinances, have provisions for bicycles and are used as the legal basis for the control devices included herein. Under the Uniform Vehicle Code, bicycles are generally considered to be vehicles, so the bicyclists have the same privileges and obligations as other drivers.

Informational documents used during the development of the signing and markings recommendations in this part of the Manual include the following:

1. Guide for Bicycles, American Association of State Highway and Transportation Officials, 1974.

2. Bikeways, State of the Art, Federal Highway Administration, 1974.

3. Bicycle Facility Location Criteria, Federal Highway Administration, 1976.

4. Bicycle Facility Design Criteria, Federal Highway Administration, 1976.

5. State and municipal design guides.

## 9A-9 Colors

The use of colors for bicycle facility traffic control devices should conform to the color code specified for signs and markings. This in part is as follows:

YELLOW-General warning

RED-Stop or prohibition

BLUE-Service guidance

BROWN-Public recreation and scenic guidance

ORANGE-Construction and maintenance warning

BLACK-Regulation

WHITE-Regulation

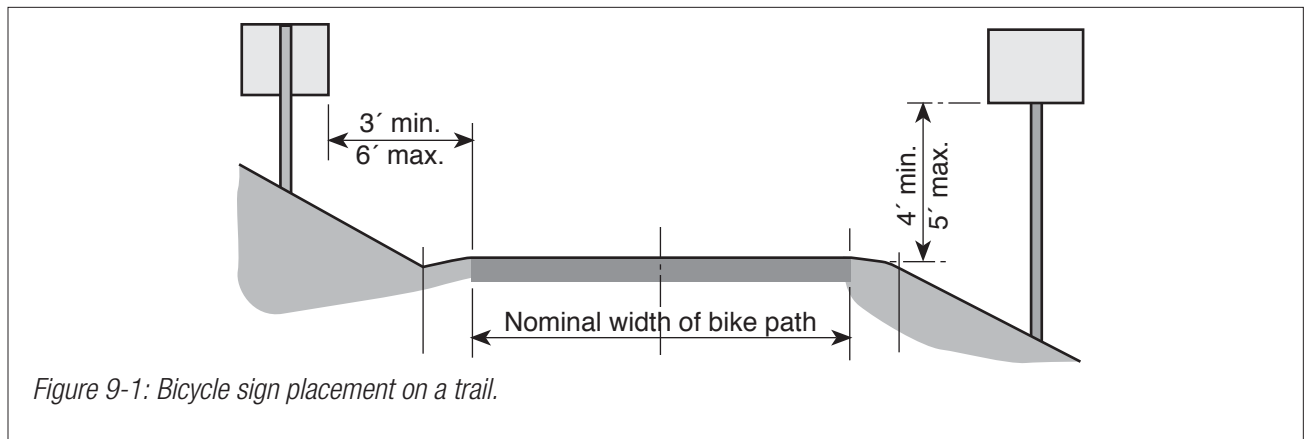
## B. SIGNS

### 9B-1 Application of Signs

Bicycle-use related signs on highways and bikeways serve three basic purposes: regulating bicycle usage, directing bicyclists along pre-established routes, and warning of unexpected conditions. Care should be taken not to install too many signs. A conservative use of regulatory and warning signs is recommended as these signs, if used to excess, tend to lose their effectiveness. The frequent display of guide signs, however, aids in keeping the bicyclist on the designated route and does not lessen their value. Some signs for the bicyclist can also serve the motorist and the pedestrian.

### 9B-2 Location and Position

Where signs are to serve both bicyclists and motorists, mounting heights and lateral placement shall be as specified in Part II, Signs. Figure 9-1 illustrates typical signing placement for bicycle trails. Overhead sign clearance on bicycle trails shall be a minimum of 8 feet. The clearance provided



should also be adequate for the typical maintenance vehicles used on the bikeway. Where signs are for the exclusive use of bicyclists, care should be taken that they are located so that motorists are not confused by them.

### 9B-3 Design

The design of signs for bicycle facilities should, whenever possible, be identical to that specified in this manual for motor vehicle travel. Uniformity in design includes shape, color, symbols, wording, lettering, and illumination or reflectorization. Detailed drawings of the standard signs illustrated in this Manual are available to State and local highway and traffic authorities, sign manufacturers, and similar interested agencies. Standardization of these signs does not preclude further improvement by minor changes in the proportion of symbols, stroke width, and height of letters, or width of borders. However, all shapes and colors shall be as indicated; all symbols shall be unmistakably similar to those shown and (where a word message is applicable) the wording shall be as provided herein.

The sign dimensions shown in this part of the Manual shall be considered standard for application on all types of bicycle facilities. Where signs shown in other parts of this Manual are intended for exclusive bicycle use, smaller sign sizes from that specified may be used. Incremental increases in special bicycle facility signs are also desirable to make the sizes compatible with signs for motor vehicles, where both motorists and bicycles benefit by a particular sign.

The sign lettering shall be in upper-case letters of the type shown in the Standard Alphabets for Highway Signs and Pavement Markings.

All signs should be reflectorized for bicycle trails as well as for shared roadway and designated bicycle lane facilities.

### 9B-4 Regulatory Signs

Regulatory signs are to inform bicyclists, pedestrians, and motorists of traffic laws or regulations and indicate the applicability of legal requirements that would not otherwise be apparent.

Regulatory signs normally shall be erected at the point where the regulations apply. The sign message shall clearly indicate the requirements imposed by the regulations and shall be easily visible and legible to bicyclists and where appropriate, motorists and pedestrians.

#### 9B-5 Bicycle Prohibition Sign (R5-6)

This sign is intended for use at the entrance to facilities, such as freeways, where bicycling is prohibited. Where pedestrians and motor-driven cycles are also prohibited from using these facilities, it may be more desirable to use the R5-10a word message sign (sec. 2B-28).

In reduced size (18 x 18 inches), this sign may be used on sidewalks where bicycle riding is prohibited.

#### 9B-6 Motor Vehicle Prohibition Sign (R5-3)

This sign is intended for use at the entrance to a bicycle trail.

### 9B-7 Bicycle Restriction Signs (R9-5 & 6)

This series of signs is intended for use where pedestrian facilities are being use for bicycle travel. They should be erected off the edge of the sidewalk, near the crossing location, where bicyclists are expected to dismount and walk with pedestrians while crossing the street.

The R9-5 sign may be used where bicycles can cross the street only on the pedestrian walk signal indication.

The R9-6 sign may be used where bicycles are required to cross or share a facility used by pedestrians and are required to yield to the pedestrians.

### 9B-8 Designated Lane Signs (R3-16 & R3-17)

The R3-16 sign should be used in advance of the beginning of a marked designated bicycle lane to call attention to the lane and to the possible presence of bicyclists. The R3-16 and R3-17 signs should be used only in conjunction with the Preferential Lane Symbol pavement marking and erected at periodic intervals along the designated bicycle lane and in the vicinity of locations where the preferential lane symbol is used (sec. 9C-4).

Where appropriate, the message ENDS may be substituted for AHEAD on the R3-16 sign and LEFT of CURB can be substituted for RIGHT on the R3-17 sign.

### 9B-9 Travelpath Restriction Signs (R9-7)

The R9-7 sign is intended for use on facilities which are to be shared by pedestrians and bicycles and on which a designated area is provided for each (sec. 9C-3). Two of these signs may be erected back-to-back with the symbols reversed for the opposite direction.

### 9B-10 Stop and Yield Signs (R1-1,2)

STOP signs are intended for use on bicycle facilities where bicyclists are required to stop. Where conditions require bicyclists and not motorists to stop, care should be taken to place the sign so it is not readily visible to the motorist.

YIELD signs are intended for use where the bicyclist can see approaching traffic and where bicyclist must yield the right of way to that traffic.



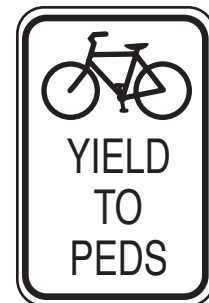
R9-6  
24" X 24"



R5-3  
24" X 24"



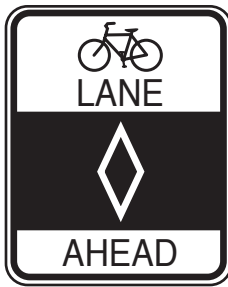
R9-5  
12" X 18"



R9-6  
12" X 18"



R9-7  
12" X 18"



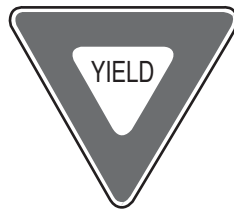
R3-16  
24" X 30"



R3-17  
24" X 30"



R1-1  
18" X 18"



R1-2  
24" X 24" X 24"



R7-9  
12" X 18"



R7-9a  
12" X 18"



R3-7  
30" X 30"



R4-4  
36" X 30"

The visibility of approaching traffic must be adequate to permit the bicyclist to stop or to take other measures to avoid that traffic.

For added emphasis STOP and YIELD signs in regular 30 x 30 inch and 36 x 36 x 36 inch sizes may be used.

The smaller signs shown below are intended for use on bicycle trails where bicyclists are required to stop or yield the right of way. If the sign applies to motorists and bicyclists, then the size should be as shown in Part II-B.

### 9B-11 No Parking Signs (R7-9, & 9a)

Where it is necessary to restrict parking, standing, or stopping in a designated bicycle lane, appropriate signs as described in sections 2B-31 through 2B-33 may be used, or signs R7-9 or R7-9a shall be used.

### 9B-12 Lane Use Control Signs (R3-7, R4-4)

Where right-turning motor vehicles must merge with bicycle traffic on designated bike lanes, the R3-7 and R4-4 signs may be used. The R4-4 sign is intended to inform both the motorist and the bicyclist of this merging maneuver. Where a designated bicycle lane is provided near the stop line, an R3-7 sign may be used to prevent motorists from crossing back over the bike lane.

### 9B-13 Warning Signs

Warning signs are used when it is deemed necessary to warn bicyclists or motorist of existing or potentially hazardous condition on or adjacent to a highway or trail. The use of warning signs should be kept to a minimum because the unnecessary use of them to warn of conditions which are apparent tends to breed disrespect for all signs.

Warning signs specified herein cover most conditions that are likely to be met. If other warnings are needed, the signs shall be of standard shape and color for warning signs, and the legends shall be brief and easily understood.

### 9B-14 Bicycle Crossing Sign (W11-1)

The Bicycle Crossing sign is intended for use on highways in advance of a point where a bike-way crosses the roadway. It should be erected about 750 feet in advance of the crossing location in rural areas where speeds are high, and at a dis-

tance of about 250 feet in urban residential or business areas, where speeds are low.

If the approach to an intersection is controlled by a traffic control signal, stop sign or yield sign, the W11-1 sign may not be needed.

### 9B-15 Hazardous Condition Sign (W8-10)

The Hazardous Condition sign is intended for use where roadway or bicycle trail conditions are likely to cause a bicyclist to lose control of his bicycle. These conditions could include slippery pavement, slick bridge, decking, rough or grooved pavement, or water or ice on the roadway. The W8-10 sign may be used with a supplemental plaque describing the particular roadway or bicycle trail feature which might be of danger to the bicyclist such as SLIPPERY WHEN WET, STEEL DECK, ROUGH PAVEMENT, BRIDGE JOINT, or FORD.

### 9B-16 Turn and Curve Signs (W1-1, 2, 4, 5, 6, 7)

On bicycle trails where it is necessary to warn bicyclists of unexpected changes in path direction, appropriate turn or curve signs should be used. They should normally be installed no less than 50 feet in advance of the beginning of the change of alignment.

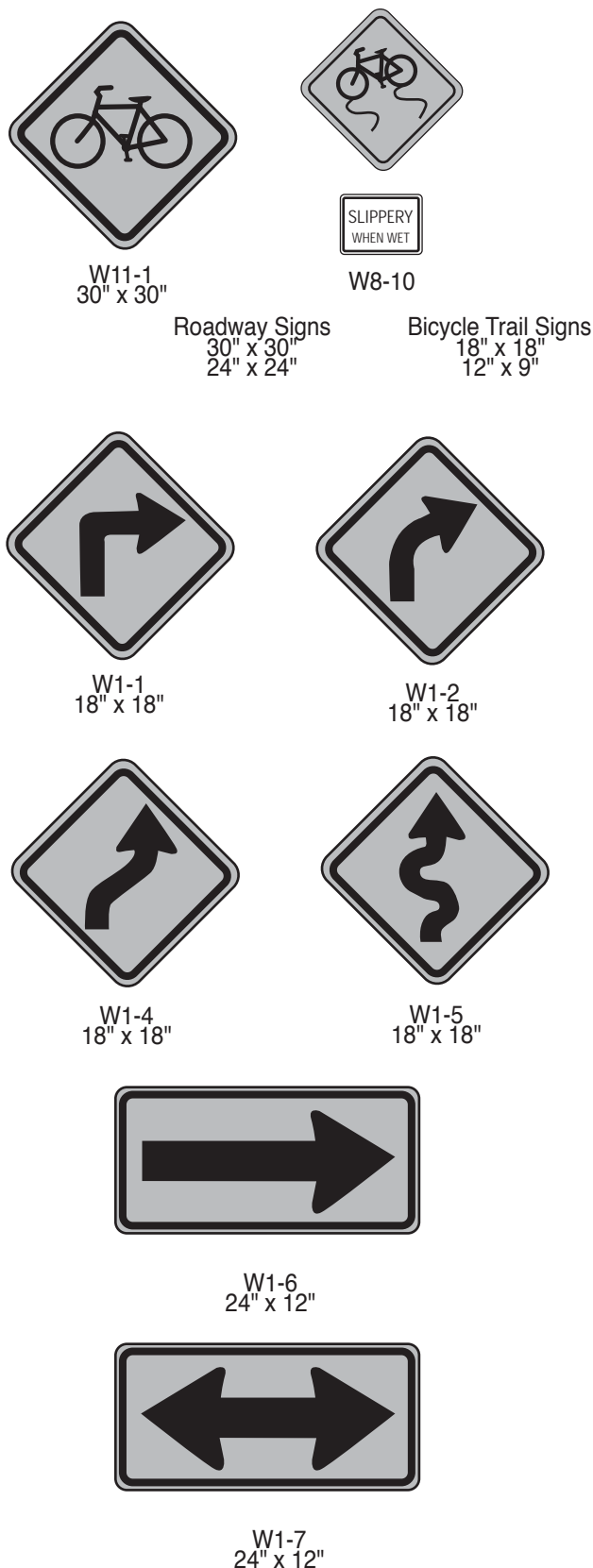
### 9B-17 Intersection signs (W2-1,2,3,4,5)

Intersection signs are intended for use as appropriate to fit the prevailing geometric pattern on bike trails where connecting routes join and where no STOP or YIELD signs are required. They should be used wherever sight distance at the intersection is severely limited, and may be used for supplemental warning at intersections where STOP and YIELD signs are erected.

### 9B-18 Other Warning Signs

Other warning signs may be required on bicycle facilities to warn riders of unexpected conditions. The intended use of these signs generally is self-explanatory. They should normally be installed no less than 50 feet in advance of the beginning of hazards.

Where construction or maintenance activity is present on bicycle trails, appropriate signs from Part VI of the Manual should be used.





W2-1  
18" x 18"



W2-2  
18" x 18"



W2-3  
18" x 18"



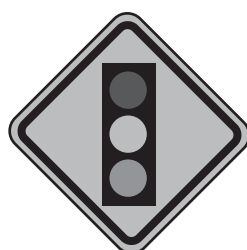
W2-4  
18" x 18"



W2-5  
18" x 18"



W3-1  
18" x 18"



W3-3  
18" x 18"



W5-4  
18" x 18"



W7-5  
18" x 18"



W11A-2  
18" x 18"



W12-2  
18" x 18"



W10-1  
18" Diameter

## 9B-19 Guide Signs

On highways where a bicyclist is sharing a lane with motor vehicles or is using an adjacent bikeway, the regular guide signing as described in Part II of the Manual will serve both modes of travel. Where a designated bikeway exists, special bicycle route signing should be provided at decision points, including signs to inform cyclists of bicycle route direction changes and confirmatory signs to ensure that route direction has been accurately comprehended.

Figure 9-2 shows an example of the signing for the junction of a bicycle trail with a highway. Figure 9-3 shows the signing and marking for the beginning and ending of designated bikeways. Guide signing should be repeated at regular intervals to ensure that bicyclists approaching from side streets know they are traveling on an officially designated bikeway. Similar guide signing should be used for shared lane bikeways with intermediate signs placed frequently enough to ensure that cyclists already on the bikeway do not stray from it and lose their way.



D11-1  
24" x 18"



M1-8  
12" x 18"

## 9B-20 Bicycle Route Sign (D11-1)

This sign is intended for use where no unique designation of routes is desired. It should be placed at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists.

## 9B-21 Bicycle Route Markers (M1-8, M1-9)

Where it is desired to establish a unique identification (route designation) for a State or local bicycle route, the standard Bike Route Marker (M1-8) should be used. The route marker (M1-8) shall contain a numerical designation and shall have a green background with a reflectorized white legend and border.

Where a bicycle route extends for long distances in two or more States, it is desirable to establish a unique numerical destination for that route. A coordinated submittal by the affected States for assignment of route number designations should be sent to the American Association of State Highway and Transportation Officials, 444 North Capitol Street NW., Suite 225, Washington, D.C. 20001. The route marker



M1-9  
18" x 24"

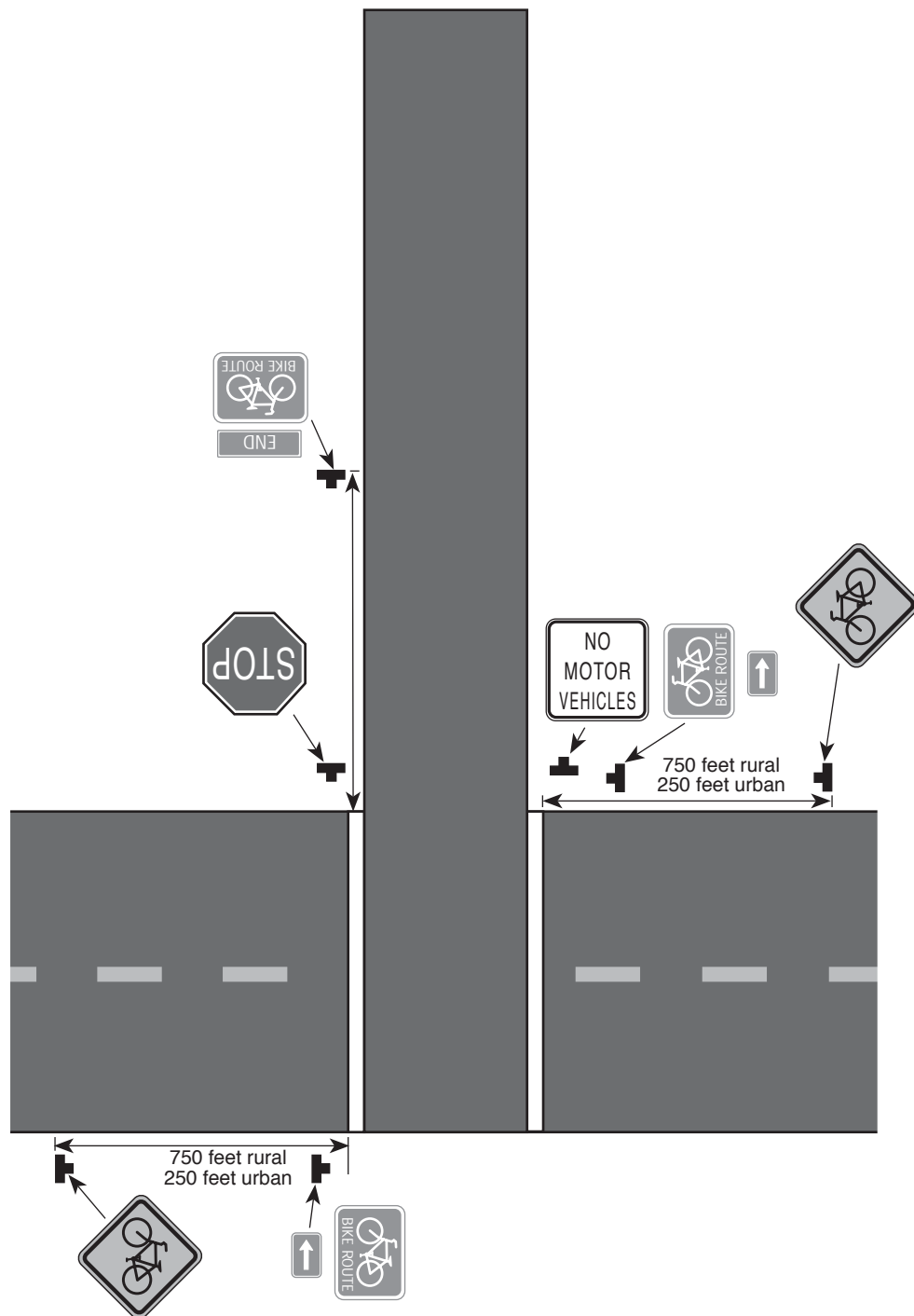


Figure 9-2: Typical signing for beginning and ending of bicycle trail.

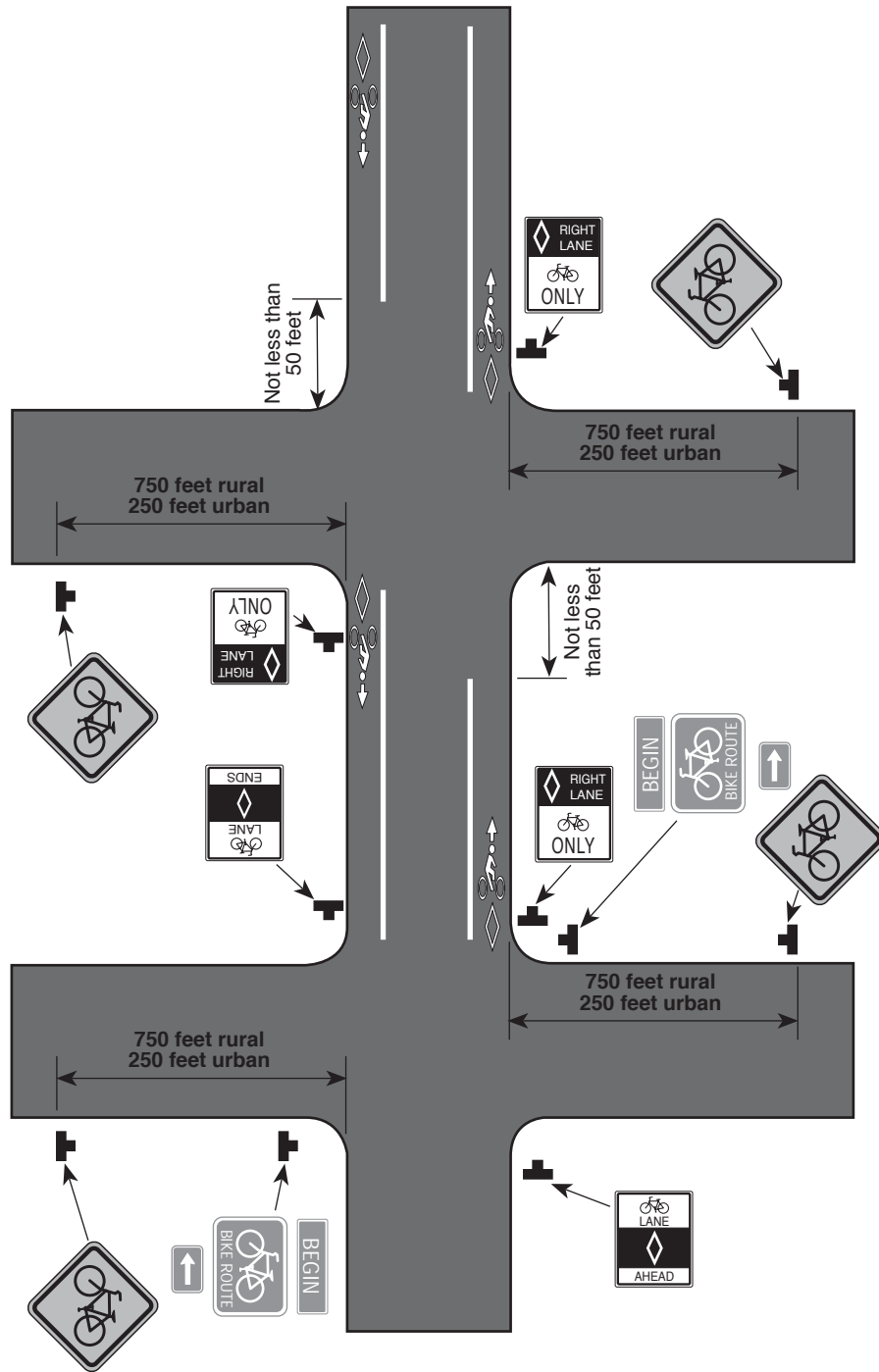


Figure 9-3: Typical signing for beginning and ending of designated bicycle lane.

(M1-9) shall contain the assigned numerical designation and have a black legend and border with a reflectorized white background.

Bike Route Markers are intended for use on both shared facilities and on designated bike ways, as required, to provide guidance for bicyclists.

## 9B-22 Supplemental Plaques for Route Signs and Markers

Where desired, supplemental plaques can be used with the D11-1 and M1-8 signs to furnish additional information, such as directional changes in the route, and intermediate range distance and destination information.

The M4-11 through M4-13 signs may be mounted above the appropriate Route Signs or Route Marker. Supplemental plaques D1-1b and

c are intended for use with the D11-1 Bicycle route Sign. The appropriate arrow sign (M7-1 through M7-7), if used, should be placed below the Route Sign or Route Marker. These signs shall have a white arrow on a green background.

## 9B-23 Bicycle Parking Area Sign (D4-3)

The Bicycle Parking Area sign may be used where it is desired to show the direction to a designated bicycle parking area within a parking facility or at other locations. The sign shall be a vertical rectangle of a standard size of 12 by 8 inches. It shall carry a standard bicycle symbol, the word PARKING, and an arrow. The legend and border shall be green on a reflectorized white background.



M4-11  
24" x 6" or 12" x 4"



D1-1b(L)  
24" x 6"



M4-12  
24" x 6" or 12" x 4"



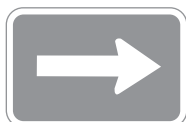
D1-1b(R)  
24" x 6"



M4-13  
24" x 6" or 12" x 4"



D1-1(c)  
24" x 6"



M7-1



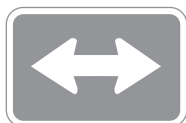
M7-2



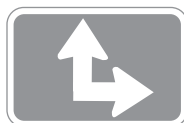
M7-3



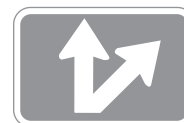
M7-4



M7-5



M7-6



M7-7

M7-1 through M7-7  
12" x 9"



D4-3  
12" x 18"

## C. MARKINGS

### 9C-1 Functions and Limitations of Markings

Markings are important on roadways that have a designated bicycle lane. Markings indicate the separation of the lanes for motor vehicles and bicycles, assist the bicyclist by indicating assigned travel paths, and can provide advance information for turning and crossing maneuvers.

### 9C-2 General Principles

Although bicycles are generally not equipped with strong lighting equipment, the added visibility of reflectorized pavement markings is desirable even where there is exclusive use by bicyclists.

Markings shall be reflectorized on bicycle trails and on facilities use by both motor vehicles and bicycles.

Recognized bikeway design guides should be used when laying out markings for a bicycle lane on a highway facility (sec. 9A-8).

The frequent use of symbols and word messages stenciled in the bike lanes, is a desirable method of supplementing sign messages. Figures 9-4 through 9-6 show acceptable examples of the application of lines, word messages and symbols on designated bikeways with and without parking for motor vehicles.

If a specific path for a bicyclist crossing an intersection is to be designated, a dotted line may be used to define such a path.

## 9C-3 Marking Patterns and Colors

The color and type of lines used for marking bicycle facilities shall be as defined in section 3A-7. Normally, center lines would not be required on bicycle paths. Where conditions make it desirable to separate two directions of travel at particular locations, a double solid yellow line should be used to indicate no passing or no traveling to the left of the line.

Where bicycle paths are of sufficient width to designate two minimum width lanes, a broken yellow line may be used to separate the two directions of travel.

Broken lines used on bicycle paths should have the normal 1 to 3 segment-to-gap ratio. To avoid having gaps excessively long, a nominal 3-foot segment with a 9-foot gap is recommended.

Where bicycles and pedestrians use a common facility, it may be desired to separate the two traffic flows. A solid white line should be used to mark this separation of path use. The R9-7 sign may be used to supplement the pavement marking (sec. 9B-9).

## 9C-4 Marking of Designated Bikeways

The diamond-shaped Preferential Lane Symbol is intended for use on highway facilities where lanes are reserved for exclusive use by a particular class of vehicle. Designated bikeways are considered as this type of lane and shall include use of the Preferential Lane Symbol as a pavement marking and on appropriate signing (sec. 9B-8). The symbols as a pavement marking shall be white and shall be used immediately after an intersection to inform turning motorists of the restricted nature of the lane. If the Preferential Lane Symbol is used in conjunction with other word or symbol messages, it shall precede them. A supplemental lane symbol or word may be used following as shown in figures 9-4 through 9-6.

## 9C-5 Word Messages and Symbols Applied to the Pavement

Where messages are to be applied on the pavement, smaller size letters can be used on exclusive bike lanes than are used on regular highways. Where arrows are needed, half-size layouts of the arrows can be used (sec. 3B-17). Optional word and symbol markings considered

appropriate for use with the Preferential Lane Symbol marking are shown in figure 9-6. Standard pavement marking alphabets and symbols have been prepared.\*

\*Available from the Federal Highway Administration (HTO20) Washington, D.C. 20590

### 9C-6 Object Markings on Bicycle Trails

There may be hazardous objects located adjacent to bicycle trails which, if visible to the rider, can be avoided with little difficulty. Such objects can be marked with highly visible markings to make their identification by approaching riders more certain. Care should

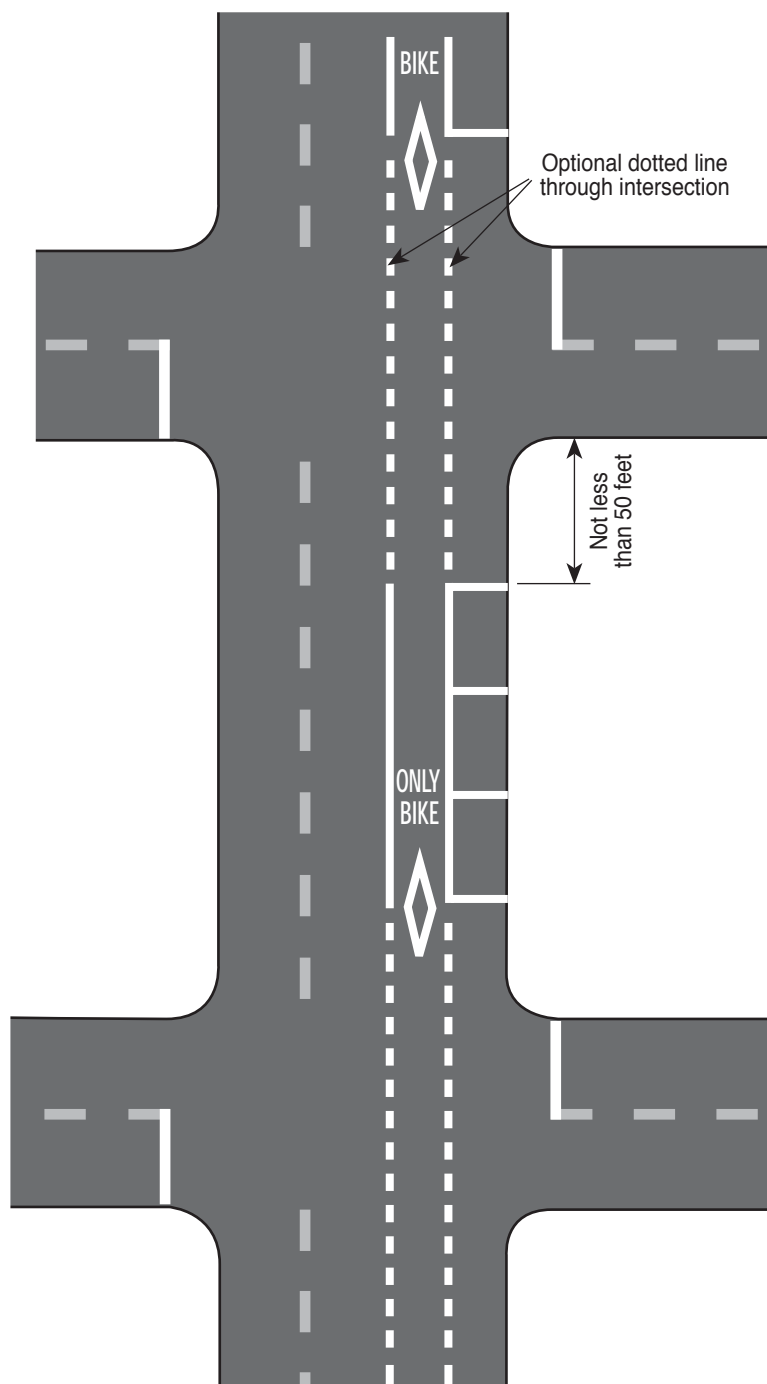


Figure 9-4: Typical pavement markings — designating bicycle lane, two-way traffic with parking and low right turn volume.

be taken to avoid having object markers become hazardous objects. Corners of object markers as well as signs should be rounded to prevent their becoming a hazard.

All object markers should be designed using reflective materials or coatings. where practical,

markers such as those described in section 3C-1 of this Manual should be used.

Where a storm drain hazard cannot be eliminated, it may be made more visible to bicyclists by defining with a white marking, applied as shown in figure 9-7.

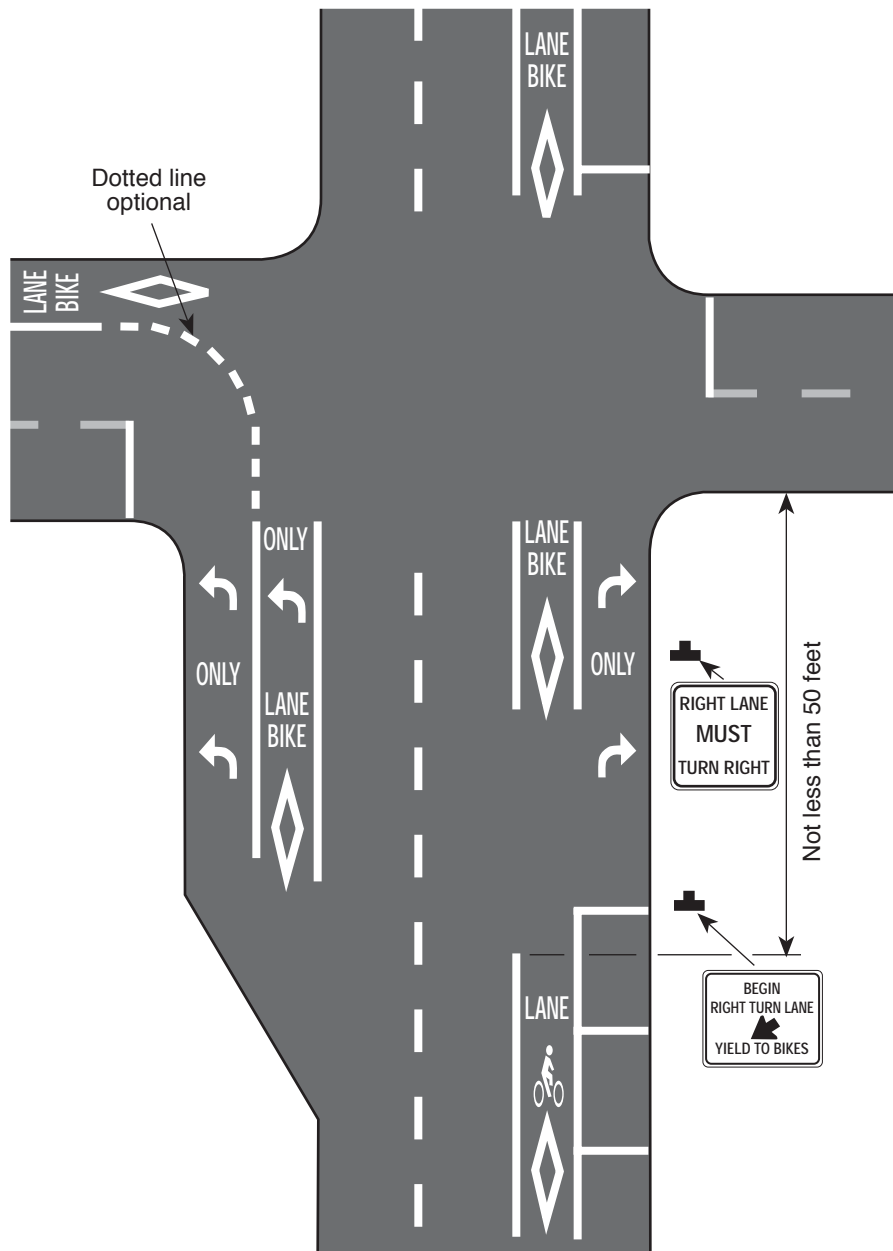


Figure 9-5: Intersection pavement markings — designated bicycle lane with left turn area, heavy turn volumes, parking, one-way traffic or divided roadway.

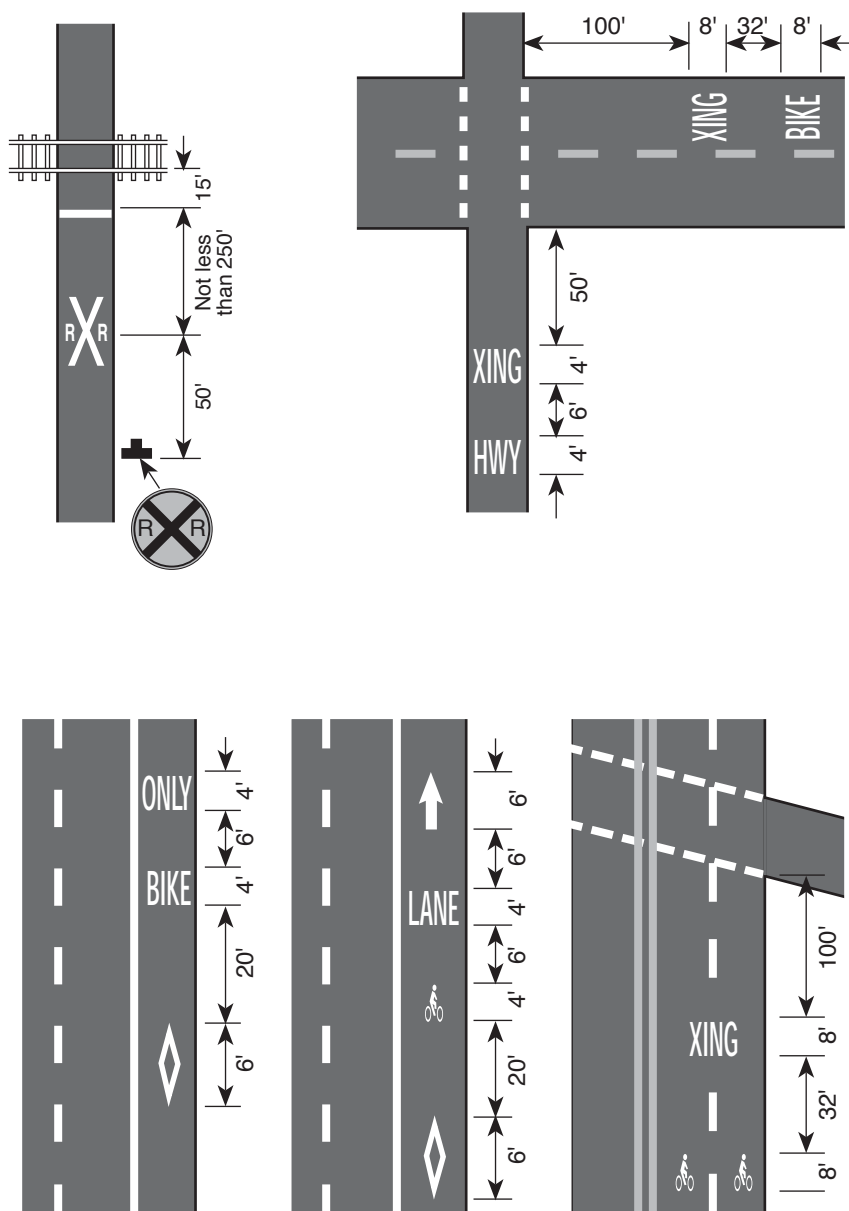


Figure 9-6: Word and symbol pavement markings for bicycle facilities.

## D. SIGNALS

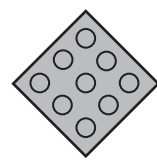
### 9D-1 Application

It is rare when a traffic signal is installed solely for bicyclists; however, at some locations there may be a need to install signal devices to facilitate bicycle travel through the intersection. For warrants and other requirements relating to signal installations, see Part

IV of this Manual. Warrants used for motor vehicles are considered appropriate for use in determining the need for signals to serve bicyclists. Warrant Four for school crossings is considered to be appropriate for bicyclists also.

### 9D-2 Visibility Requirements

At installations where programmed signals are



Type I  
18" x 18"



Type II  
6" x 12"



Type III  
12" x 36"

used, special attention should be given to adjusting the signals so bicyclists on the regular bicycle lanes or travel paths can see the signals. If programmed signals cannot be aimed to serve the bicyclist, then separate signals shall be provided.

*For convenience, "Part IX Traffic Controls for Bicycle Facilities" of the MUTCD has been included in this Appendix. Readers are encouraged to purchase the entire document.*

### 9D-3 Signal Operation for Bicycles

Bicycles generally can cross intersections under the same signal timing arrangement as motor vehicles. Where bicycle use is expected, extremely short change intervals should not be used and an all red clearance interval may be necessary.

Chapter X included general comments on placing traffic control devices on bicycle routes, lanes, and paths. The reader should refer to the appropriate sections for suggested applications of traffic control devices. However, specific applications of traffic control devices on bike-ways must be in accordance with the MUTCD.

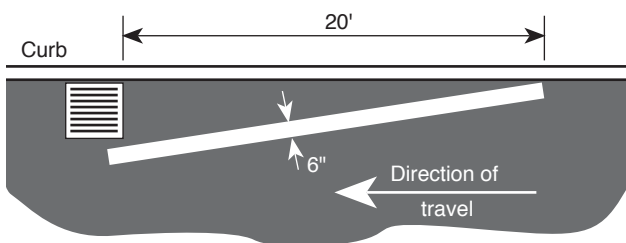


Figure 9-7: Typical marking in advance of drainage hazard.

# Appendix 5 North Carolina Signs

The following signs were created by the North Carolina Department of Transportation Office of Bicycle and Pedestrian Transportation and are specific to North Carolina.

## Warning signs

**Share the road (W28-1):** This subplate, when combined with the W11-1 warning sign is intended to increase bicyclists' visibility without designating the signed roadway as a preferred route. It is intended for use on roadways with high levels of bicycle traffic, but relatively hazardous conditions for bicyclists. Its intention is not to encourage inexperienced bicyclists to ride on the roadway as a preferred route.

This sign is especially useful in cities and towns where there are large numbers of bicyclists riding on streets which are unsuitable for designation as preferred bicycle routes due to factors such as narrow lanes, high speed traffic and/or high traffic volumes.

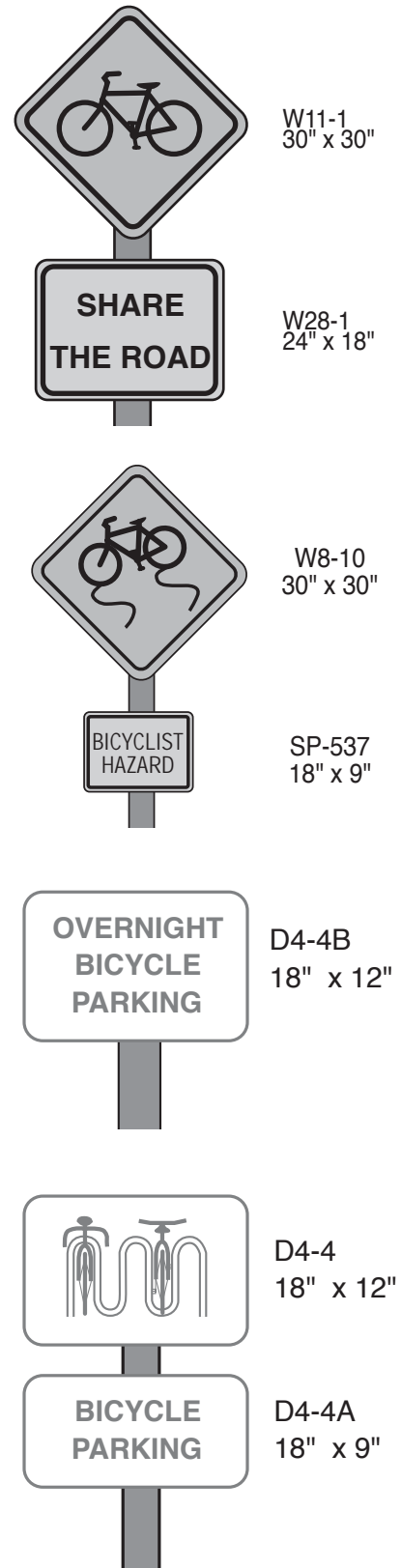
**Bicyclist Hazard (SP-537):** This subplate, when combined with the W8-10 warning sign is intended to warn bicyclists of the presence of a surface condition that could cause them to lose control.

## Information signs

**Overnight Bicycle Parking (D4-4B):** This sign is a special purpose sign intended to identify bicycle parking that may be used overnight.

**Bicycle Parking (D4-4 and D4-4A):** These signs are special purpose signs intended to show bicyclists how to use a Ribbon Rack-type parking device. They should be used at such installations where the probability of confusion is high, particularly those where new users, who may never have seen such a device, are common.

Figure 1: Various signs developed for specific purposes by the North Carolina Department of Transportation Office of Bicycle and Pedestrian Transportation.





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- California Highway Design Manual*; CalTrans, 1987
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- Bicycle Transportation*, John Forester, 1983
- Bicycles & Traffic Signals*, Technical Note F2, John Williams, Bicycle Forum, 1990
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- Evaluation of Wide Curb Lanes as Shared Lane*

*Bicycle Facilities*; McHenry & Wallace, 1984  
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*Pro-Bike News*, the Bicycle Federation of America, monthly

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